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IN THREE SECTIONS

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N.A.C.A. LIBRARY

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EDITORIAL DEPARTMENT NOTE

We are all interested in the development of the program of the N. R. A. and are hopeful, even confident, that permanent benefits to our commercial and industrial institutions are being brought about. Owing, perhaps, to the acknowledged experimental nature of the whole project, there have been comparatively few official advance statements of policies or intentions by those concerned with the operation of the N. R. A. In this issue of our Bulletin we are publishing an address by one of the Division Administrators of the N. R. A. in which he discusses the hopes and accomplishments of the N. R. A. and, particularly, the accounting views of the Administration.

A. D. Whiteside, the author of this paper, is one of the four divisional administrators recently designated under the National Recovery Administration. He was one of the first deputy administrators appointed after the passage of the Recovery Act and has the distinction of having presided at the first hearing to be conducted on codes, namely, that for the cotton textile industry. A graduate of Princeton University, Mr. Whiteside has been identified principally with activities in the field of credit. Following several years with the National Bank of Commerce, he became associated with A. G. Hyde and Sons, an agency dealing in cotton goods commodities. From 1907 to 1912, he was with the Credit Office, a textile credit agency serving banks and others. Following this, he organized the National Credit Office, New York, becoming its president, and retaining that position at present. Mr. Whiteside was president of the Wool Institute from 1927 to 1930. He then became president of R. G. Dun and Company, and of Dun and Bradstreet, Inc., offices which he still retains. The paper here presented was given before the Washington Chapter, September 20, 1933.

R. E. Jacke, the author of the second paper, has presented here the cost of commercial printing jobs which appears to be fundamentally sound and simple to operate. Its real value would seem to be in its simplicity and the speed and accuracy with which it may be used in estimating quotations on printing contracts. It is a rather technical paper, but one well worth the close study by anyone engaged in the printing industry.

Mr. Jacke has been Secretary of our Louisville Chapter for the past six years and is the author of "Simple Application of Gain-Sharing Principles" which appeared in our September 15, 1932, Bulletin.

Cecil Charlton [illegible]uthor of the third paper, has described here a method of [illegible]ining the costs incurred in operating a commercial art sh[illegible]. The plan described is clear and appears simple to operate [illegible]is discussion is based upon actual experience in its opera[illegible]. Mr. Charlton received his early education and accounting experience in England. He came to the United States a few years ago and was for two years employed as a cost accountant in the Scranton office of the American Record Corporation.

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PROGRESS OF THE NATIONAL RECOVERY ADMINISTRATION

A. D. Whiteside, President, Dun and Bradstreet, Inc., Division Administrator, National Recovery Administration

IT IS not difficult to appreciate why the National Industrial Recovery Act was drawn. There were approximately 13,000,000 men out of employment, and the object was to put them back to work. The Act specifically states that employment shall be restored on the basis of a living wage. It is rather difficult to do both at the same time—it complicates the job. Personally, I believe that if enough men are put back to work, purchasing power will increase, business will pull itself up and bring wages to the proper level.

We started about June 1 to prepare for the administration of the Act. This was before the bill had been signed. On June 5, after we knew in general what the Act would contain, we prepared the administrative procedure. We tried to simplify the drafting of codes by suggesting that provisions be confined to questions pertaining to wages and hours. That went along fairly well until the hearing on the cotton textile code. In the meantime, a great many trade practices had been added to various other codes. This development made it imperative to break away from the simple procedure originally outlined. Time passed—the hearing of difficult codes caused considerable delay.

President's Reemployment Agreement

About the 4th of July, it became apparent that further measures must be undertaken if real progress was to be achieved by Labor Day. So the President's Reemployment Agreement was drawn. It was drawn quickly and had to cover a wide field. This went into effect August 1. We saw it would need modifications so we took advantage of the provisions of the agreement to allow exceptions where strict compliance with its terms would work hardships on particular industries or individual concerns.

The first general exception made was for the grocery and food products industry. Another exception covered retailers and wholesalers. The retailers substitute code was applied to the seven most important groups in the country. When these exceptions were ap-

proved, about 1,600,000 concerns were relieved of particular hardships, namely, wages substantially higher than they were then paying or could pay immediately.

The P.R.A. has about worked itself out. Approximately 80% of the concerns in this country are now under some form of agreement with the President as to hours and wages. I am convinced that a great many concerns—probably 25 or 30% of the total—were not fully aware of what they signed. They just knew that they were doing something for the President and did it in a fine spirit. Other concerns did not anticipate what it meant to them, but yet signed the agreement. Later, they encountered some difficulties in living up to their agreements.

Additions to Payrolls

At the present time, the number of workers reemployed under approved codes of fair competition is relatively small. On the other hand, the number of reemployed under agreements and substitute codes is really significant. Possibly about 4,500,000 men have been put to work directly as a result of N.R.A. activities. Evidences of substantial increases in the number of employees in particular firms may be referred to. One large chain store company has added more than 13,000 new employees and approximately $11,000,000 to its annual payroll. We have evidence of considerable reemployment among retailers. Many persons previously on part time are now working full time. In addition, thousands have been employed on a part-time basis. I believe that as soon as we have an increase in employment amounting to approximately 25% we will see a real pick-up in business.

Minimum Wages

There has been some misunderstanding regarding the meaning of minimum wages. The minimum wage is meant to apply to common labor and should be approximately the same in all industries I am convinced that hundreds of millions of dollars have been added to payrolls throughout the country because of the adoption of minimum wage rates.

Operations of Codes

There is much to be done to make effective the codes now in operation. Recently there was quite a bit of discussion to the ef-

fect that there has been a great many violations of the cotton textile code. I asked a prominent executive in the industry what his experience had been. He told me that he was more contented with the situation as it now stands than at any time in the last four or five years, even preceding the crash in Wall Street. What we have done in this industry, we will do in others. Men have not quite realized yet that they must work together.

We want to put all industry in every part of the United States on a comparable basis. In the textile industry there was great concern in the North on account of the loss of about half of its spindles to the South. There was just as much concern in some parts of the South about the competition from states consistently paying lower wages. The situation is excellent now.

One interesting point came up at the hearing of the silk code—it seemed the silk and rayon codes were conflicting. It was decided that both codes should be on the same basis. The moment this was done, it was realized that the situation required correction. The point in mentioning that is this—codes are the laws of industry. Codes cannot be lightly modified and no code can be opened excepting under most urgent circumstances. Both groups felt they would be working under industry laws which could not easily be changed. The attitude of the silk men was that in most respects the two products were on a highly competitive basis.

It is unlikely that any code will be changed unless for some fundamental reason, and then the initiative for such a change should come from the industry itself.

Selling Below Cost

Many questions have been raised regarding the inclusion in codes of fair competition of provisions relating to selling below cost. Provisions of this nature were put into codes to take the place of price fixing. Many industries have come to us asking that some thing be done with regard to stabilizing their price structure. Provisions prohibiting selling below cost have partly answered the demand. There is a difficulty encountered, however, in the fact that many industries do not know what their cost is. They do not have adequate accounting methods to show cost, nor do all manufacturers follow a uniform method of cost ascertainment.

Provisions for selling below cost have usually referred to the cost of the individual manufacturer. It is difficult to establish a fair cost which might be used as an average for a whole industry. If an average is taken, it is probable that as much as 35% of the concerns in the industry would be legislated out of business. The Recovery Act contains no provisions guaranteeing a profit to anyone.

Price Cutting

Constructive steps can be taken to eliminate destructive price cutting. Probably 70% of the complaints regarding price cutting are based on imaginary situations. Of the remaining 30%, probably half of it is resorted to for self-preservation. Eighty per cent of all concerns, at one time or another, are compelled to sell goods at exceedingly low prices in order to convert merchandise into cash. Probably every concern in business meets this condition once every five years. They may not be faced with bankruptcy, but they have come to a situation where they would be compelled to go through bankruptcy if they did not liquidate their merchandise at prices which had no relation to costs.

As a constructive step to eliminate price-cutting, it might be suggested that the point of view of distributors be changed. They should be made to realize that good merchandise should demand a fair price and that price cutting leads but to lowering of quality.

Other Price Problems

We have received some complaints to the effect that manufacturers have unduly increased their prices to distributors. In one industry where this complaint was raised, we asked the manufacturers to adjust the matter, and they gladly cooperated. This situation led to further cooperation between the manufacturers and the distributors. Our only action in this instance was to ask the manufacturers to review the case. They gave us splendid support.

In some instances, we believe that retailers have been lax in watching the development of manufacturers' codes. In some instances, codes have stipulated discounts and other credit terms different from those usually granted. Unless the buyers of manufacturers' products watch these developments and present their case at the public hearings, provisions will get into codes to which

they will later object. It must be realized, however, that manufacturers operating under codes will be confronted with higher costs and it can be expected that these costs will be passed on to the distributor and the consumer. In cases where prices have been advanced more than seemingly necessary, the situation should be brought to the attention of the administrative agency of the code.

It would be an enormous task for the government to attempt to control price advances. We must expect that prices will adjust themselves in accordance with supply and demand. In many cases, prices are now below their proper level, and some increase can be expected. As a practical business proposition it is difficult to maintain a price unless it is justified.

Relation to Anti-trust Laws

It must be understood, however, that the Recovery Act supersedes certain parts of the anti-trust acts. We are now working under a consent decree, and it is possible under the Act that price fixing might be carried out through agreement by members of an industry. One word of caution may be required, however. There are a number of people now violating the anti-trust laws, although they are doing it unconsciously. They believe that since they have filed a code, they are immune from the trust laws. But this is not so. They must wait until their code has been approved in its final form.

Self-government of Industry

It is the general policy of the Administration that business shall govern itself. For the most part, the administration of codes will fall under the jurisdiction of trade associations. The trade association has been asked in a number of cases to correct violations of codes which have been approved. The Recovery Administration will give attention mainly to exceptional cases. We want industry to govern itself.

In the past, many industries have collected statistics through their trade associations. I believe that this practice should continue. Although many persons have suggested that the government assume the responsibility for collecting all statistics, I believe they should be collected by industry, and that the government should only check the figures. In many cases, of course, the government

collects information covering a wide field, and the figures are compiled with extreme accuracy. There is no reason, however, why industry should not collect its important statistics, leaving to the government the coordination of such data.

The whole situation now is about to undergo a change. Altogether more than a thousand codes have been submitted. These have been drawn quickly in many cases and have not been correctly synchronized in many respects. Some codes conflict; some tend toward price fixing and others go mighty near it. Many have shown a tendency to digress from the fundamental principles which the Administration felt important at the very beginning.

To achieve real progress in the preparation and administration of codes, intelligent planning is required. A comprehensive plan for continuing the work begun is now being formulated. I believe industry will be benefited greatly in the long run. With everyone working together, the objects of the National Industrial Recovery Act will be attained.

PRINTING COST ESTIMATING FOR PRICE SETTING

By R. E. Jacke,
Secretary, Louisville Chapter

Introduction:

PRICE setting in the printing industry is generally recognized by purchasers to be more inconsistent than in any other industry. To bear this out one needs but submit the same sample to four or five printers for bids and then check the variations. Such a condition cannot possibly be caused entirely by certain advantages enjoyed by one over another; that is, in such elements as location, equipment, labor, power, etc. A large part of this inconsistency is unquestionably due to their relative knowledge of costs and the choice variations of the estimator. Many printing plants have dependable costs but there are probably more of the other class. This article concerns the first group and is intended to describe an idea for a possible standard method by which a fairly accurate cost may be quickly and conveniently computed. It is astonishing how much time is consumed in estimating costs and submitting prices when considering the percentage of orders materializing from this effort. Of course the importance of this function cannot be over emphasized since therein lies the difference between profit and loss. But a considerable saving could undoubtedly be realized if there were a means of minimizing and facilitating this work with the same results. This might also be the means of securing an order if at the time a prospective customer is sold on a particular job the price could be promptly submitted before there is chance for the cooling. This would eliminate a second selling, and possible loss of the order because of better salesmanship by a competitor.

The method about to be described takes the form of a chart as illustrated by Figure 1. This chart has been accurately assembled, based upon meaningless costs which are sufficiently proportionate to the actual for the purpose of explanation. The variations to be considered are typical of sheet printing on special surfaced paper but substitution can be made to the principle for other variations peculiar to any specialized printing.

Development of Chart:

The first element to be considered is the relationship between the cost of plates and the labor varying directly with the number of

sheets required. Since both of these costs are variable it must be assumed for the purpose of establishing the original chart that the labor is constant at $1 per 1,000 impressions. Then it must be determined upon this constant the number of single plates of various sizes that are justified by certain quantity limits ascertained from the value of impressions saved at $1 per 1,000 compared with the actual cost of printing plates. This is the most important feature of the plan and consequently further explanation is required.

Start with the cost of plates which are available from standard price charts published by electrotypers. Anyone familiar with printing knows that the cost of plates increases with the area, but in diminishing proportion. This implies, of course, that the area unit cost decreases as the size increases. Also, there are variations to be considered which depend upon the form of plates ordered, such as, blocked on wood, unblocked for patent base, curved nonstretch for Upham and Rotary Presses, etc. These exceptions can all be included by accurate adjustments in a chart properly developed. The selection of the most usual one of these forms should then be made for the purpose of valuing, on the basis of net cost, certain representative area classifications.

Next is the important dual element of labor. This includes only that part of the labor determined upon the sheet basis and which does not vary according to the number of cuts. Consider for example a few operations of this nature, now to be enumerated: press feeding, sheet inspection, handling time for cutting board. All such labor costs are essentially the same for 20 cuts as for 10 cuts. Hence it is the object to accumulate this labor value per 1,000 sheets according to the several variations required by different presses or additional processes. This procedure might be justly questioned for failure to include overhead. The reason for this is that overhead is not appreciably affected by the increase or decrease in the time required to produce a given quantity, but rather the volume of business causes the major fluctuations due to the far greater proportion of fixed charges. Besides, it is more desirable to use plant equipment as much as possible in preference to purchasing supplies to reduce its use, provided the actual labor cost does not exceed the expense of such supplies.

Now for consideration of the principle involved in the development of the chart. This perhaps can best be stated by the mathe-

(Approx. Cost of Art Work)	Based upon Area and Complexity of Design - $5.00 t					
(Approx. Cost of Etching - 1 Col.)	3.55	4.28	5.11	6.09	7.	
(Approx. Cost of Each Electro - 1 Col.)	1.17	1.50	2.00	2.75	3.	

ELECTRO COST ADJUSTMENT	Electro Sets		8 sq. in Under	8 - 15 sq. in.	15 - 25 sq. in.	25 - 40 sq. in.	40 sq. in.
2 Col. Upham - 125%	1-Up	(Quantity Limit)	1400	1800	2400	3300	
3 Col. Upham - 117%	2 "	" "	4200	5400	7200	9900	1
4 Col. Upham - 125%	3 "	" "	8400	10800	14400	19800	2
(Apply to Group Values	4 "	" "	14000	18000	24000	33000	4
of Electrotypes above	5 "	" "	21000	27000	36000	49500	6
chart when Upham Press	6 "	" "	33600	43200	57600	79200	10
is used)	8 "	" "	56000	72000	96000	132000	18
	10 "	" "	84000	108000	144000	198000	27
	12 "	" "	117600	151200	201600	277200	37
	14 "	" "	156800	201600	268800	369600	50
	16 "	" "	201600	259200	345600	475200	64
USE OF CHART	18 "	" "	252000	324000	432000	594000	81
Adjust quantity ordered	20 "	" "	308000	396000	528000	726000	99
by percentage obtained	22 "	" "	369600	475200	633600	871200	
from table below and	24 "	" "	436800	561600	748800	1029600	
apply to group deter-	26 "	" "	509600	655200	873600	1201200	
mined by area of de-	28 "	" "	588000	756000	1008000	1386000	
sign and read across	30 "	" "	735000	945000	1260000	1732500	
to left for number of	35 "	" "	980000	1260000	1680000		
printing plates per	40 "	" "	1260000	1620000	2160000		
sheet.	45 "	" "	1575000	2025000	2700000		
(Charted quantity re-	50 "	" "	1925000	2475000			
presents absolute limit	55 "	" "	2310000	2970000			
above which additional	60 "	" "	2660000	3420000			
plates are justified)							

TO DETERMINE NUMBER OF ELECTRO SETS - (APPLY TO QU

TYPE OF PRESS	Max.Sht.	Colors	Regular Operation 1-Imp.	2-Imp.	3-Imp.	4-Imp.	Addition for 1-Imp.	2-Imp.	
Small Miehle (Pony)	22 x 32	1 Col.	151%	232%			65%		
1-C Flatbed/2-C Upham	25 x 42	"	181%	292%			76%		
2-C Flatbed	25 x 48	"	192%	314%			84%		
Small Miehle (Pony)	Same	2 Col.		116%	156%	198%	33%	78%	
1-C Flatbed/2-C Upham	"	"	(91%) 73%	(146%)117%	(201%)161%		(38%)30%	(89%)71%	
2-C Flatbed	"	"	98%	157%	218%		42%	97%	
Small Miehle (Pony)	"	3 Col.			104%	132%	22%	82%	
1-C Flatbed/2-C Upham	"	"		(97%) 83%	(135%)115%	(172%)147%	(28%)21%	(60%)51%	
2-C Flatbed	"	"		105%	146%	187%	28%	65%	
Small Miehle (Pony)	"	4 Col.				99%	16%	39%	
1-C Flatbed/2-C Upham	"	"		(74%) 89%	(100%) 80%	(128%) 103%	(19%)15%	(46%)36%	
2-C Flatbed	"	"		79%	109%	140%	21%	49%	

1. Use only the group indicated by number of colors required.
2. Percentages in color groups must be assembled by addition according to job
3. Lowest net percentage obtained from possible combinations indicate cheapest
4. Small orders requiring sheet of less than 300 sq. ins. should be refigured

sign - $5.00 to $25.00							
6.09	7.40	9.05	12.31	16.35	22.45	31.69	(Over 3
2.75	3.75	5.00	7.00	9.50	13.75	19.25	(Over 3

25 - 40 sq. in.	40 - 60 sq. in.	60 - 85 sq. in.	85 - 125 sq. in.	125 - 175 sq. in.	175 - 250 sq. in.	250 sq. in.over	(Classi from ex
3300	4500	6000	8400	11500	16500	23100	
9900	13500	18000	25200	34500	49500	69300	
19800	27000	36000	50400	69000	99000	138600	
33000	45000	60000	84000	115000	165000		
49500	67500	90000	126000	172500			TO DET
79200	108000	144000	201600	276000			
132000	180000	240000	336000				A - MAT
198000	270000	360000	504000				
277200	378000	504000					B - COM
369600	504000	672000					
475200	648000						1-C
594000	810000						
726000	990000						
871200							
029600							2-C
201200							
386000							
732500							C - PRI
							D - INS

- (APPLY TO QUANTITY ORDERED)

Addition for Slipsheeting				Addition for Single-Sheet Layout				
	2-Imp.	3-Imp.	4-Imp.	1-Imp.	2-Imp.	3-Imp.	4-Imp.	
6%				90%				
8%				119%				
4%				135%				
5%	78%			45%	90%			E - PRI
0%	(89%)71%			(60%)48%	(119%)95%			
2%	97%			68%	135%			F.- ART
2%	82%	82%		30%	60%	90%		
1%	(60%)61%	(94%)80%		(40%)34%	(80%) 68%	(119%)102%		
8%	85%	101%		48%	90%	135%		G - ABC
9%	39%	82%	84%	23%	48%	68%	90%	H - SEL
5%	(48%)36%	(70%)56%	(95%)76%	(30%)24%	(60%) 48%	(89%) 71%	(119%)95%	
1%	49%	76%	103%	34%	68%	101%	135%	

ording to job requirements before applying to quantity ordered.
dicate cheapest operating method - use parenthetical figures for comparison only.
l be refigured for Pony Press.

FIGURE 1

m - $5.00 to $25.00							
09	7.40	9.05	12.31	16.35	22.45	31.69	(Over 350 sq. ins. - Use .091 per
75	3.78	8.00	7.00	9.58	13.75	19.25	(Over 350 sq. ins. - Use .055 per

- 40 in.	40 - 60 sq. in.	60 - 85 sq. in.	85 - 125 sq. in.	125 - 175 sq. in.	175 - 250 sq. in.	250 sq. in.over	(Classification based on area dete from extreme dimensions of printed
300	4500	6000	8400	11500	16500	23100	
900	13500	18000	25200	34500	49500	69300	
800	27000	36000	50400	69000	99000	138600	
000	45000	60000	84000	115000	165000		
500	67500	90000	126000	172500			TO DETERMINE COST OF PRINTED STOCK
800	108000	144000	201600	276000			
000	180000	240000	336000				A - MATERIAL - List price of unpri
000	270000	360000	504000				Trim - Allow one-half inch
200	378000	504000					B - COMPOSITION and MAKE-READY -
600	504000	672000					(Electros) 1 -
200	648000						1-Color
000	810000						(Pony) Miehle $ 9.
000	990000						1C-Flatbed/2C-Upham 12.
200							2C Flatbed 15.
600							2-Color (1 Imp.)
200							2C-Upham 18.
000							2C-Flatbed 23.
500							C - PRINTING (Per M Impressions)
							Ru Ea
							(Pony) Miehle $ 2.
							1C-Flatbed/2C-Upham 4.
							2C-Flatbed 4.
							D - INSPECTION/ CUTTING/ PACKING
							(Area of Cut) 20
							Und
							4 Cuts $ -
							8 Cuts
							12 Cuts
							20 Cuts
							30 Cuts
							Up Cuts
							E - PRINTING INK (Per M Wrappers)
							Estimate Area of ink cov
							F.- ART WORK - ETCHINGS - ELECTRO
							Estimated from values ab
							Art work based upon a
							Etching Cost - Multip
							Electro Cost - Multip
							G - ABOVE COSTS INCLUDE - All lab
							H - SELLING EXPENSE - (Not includ

(APPLY TO QUANTITY ORDERED)

Addition for Slipsheeting			Addition for Single-Sheet Layout			
2-Imp.	3-Imp.	4-Imp.	1-Imp.	2-Imp.	3-Imp.	4-Imp.
			90%			
			119%			
			135%			
78%			45%	90%		
(89%)71%			(60%)48%	(119%)95%		
97%			68%	135%		
82%	82%		30%	60%	90%	
(60%)51%	(94%)80%		(40%)34%	(80%) 68%	(119%)102%	
68%	101%		45%	90%	135%	
39%	62%	84%	23%	45%	68%	90%
(45%)36%	(70%)56%	(95%)76%	(30%)24%	(60%) 48%	(89%) 71%	(119%)95%
49%	76%	103%	34%	68%	101%	135%

ding to job requirements before applying to quantity ordered.

te cheapest operating method - use parenthetical figures for comparison only.

refigured for Pony Press.

FIGURE 1

. - Use .091 per sq. in.)
. - Use .055 per sq. in.)

ased on area determined
nsions of printed Design)

OF PRINTED STOCK (BASED ON NUMBER OF ELECTROS PER SHEET)

st price of unprinted Stock plus 5% spoilage.
low one-half inch on short dimension of net ptg. sheet for grippers.
nd MAKE-READY - (Assemble according to number of colors per job).

(Electros)	1 - 4	5 - 9	10-14	15-20	21-26	27-32	33-Up
hle	$ 9.89	$ 9.99	$ 11.01	$ 11.90	$ 13.08	$ 14.04	$ 15.68
/2C-Upham	12.45	12.85	13.87	14.79	15.98	16.97	18.65
	13.81	14.21	15.23	16.15	17.34	18.33	20.10
p.)							
	18.94	21.99	26.38	31.14	36.17	41.14	48.86
	23.87	24.51	26.62	28.53	31.00	33.08	36.39

Impressions)

	Regular Oper. Emb.	Plain	Addition for Slipsheeting	Addition for sheet lay-out
hle	$ 2.94	$ 3.05	$ 2.86	$ 2.87
/2C-Upham	4.01	4.12	3.15	3.66
	4.42	4.62	3.36	4.13

TTING/ PACKING (Per # sheets)

nt)	20 sq. in. Under	To 40 sq.in.	To 80 sq.in.	To 150sq.in.	To 250sq.in.	Over 250sq.in.
	$ -0-	$ 1.39	$ 1.71	$ 1.85	$ 2.16	$ 2.20
	1.45	1.74	2.07	2.22		
	1.60	1.97	2.38			
	1.94	2.53				
	2.38	2.92				
	2.87					

(Per M Wrappers)
Area of ink coverage and multiply times $ .005 per # sq. ins.
HINGS - ELECTROS (Per Job)

from values above chart - based upon largest area of group.
rk based upon area and complexity of design - $5.00 to $25.00.
g Cost - Multiply by number of colors.
o Cost - Multiply by number of colors and number of sets.
CLUDE - All labor, plant overhead and New York Charge.

E - (Not included - add to total manufacturing cost)

matical mouthpiece—the equation. First, let it be assumed that there are three known factors, namely:

1. Quantity ordered	(Represented by)	Q
2. Labor cost (Per M Sheets)	(Represented by)	L
3. Plate cost (Per Set)	(Represented by)	P
To Find 4. Number of plates per sheet	(Represented by)	X

Then: (Q) divided by (X) equals number of sheets.
Also: Number of sheets times (L) equals cost of labor.
Also: (P) times (X) equals cost of plates.

The lowest cost is obtained by keeping an even balance between labor cost and cost of plates.

Therefore: $\frac{Q \times L}{X} = PX$

$PX^2 = QL$

$X^2 = \frac{QL}{P}$

Substitution: Let Q equal 100,000
Let L equal $2.00
Let P equal .50

Then: $X^2 = \frac{100M \times 2.00}{.50}$

Or: $X^2 = 400$

Or: $X = 20$

Proof: 100,000 pieces divided by 20 equals 5,000 sheets.
5,000 sheets times $2.00 equals $10.00 actual labor cost.
20 plates times $.50 equals $10.00 cost of plates.
Suppose: 10 plates instead of 20 were used.
Then: 10,000 sheets at $2.00 would be $20.00
And: 10 plates at $ .50 would be $ 5.00

This would result in a net loss of $5. Likewise if 40 plates were used, a net loss of $5 would be sustained from an excess cost of plates rather than excess labor resulting from fewer plates.

By use of the above equation, here repeated—

$X^2 = \frac{QL}{P}$ it can be easily understood that by using constants for (L) or (P) any variation affecting the former can be applied in direct proportion to (Q) and also any variation affecting (P) can be applied in inverse proportion to (QL). Furthermore the equation may be changed to solve for (Q) with the other three units known. Therefore by using $1 per M sheets as a constant for (L) the exact quantities (Q) that apply to consecutive order of plates (X) may be determined for any classification of size. Then any variation affecting the labor cost per M sheets may be applied as a percentage adjustment to the original quantity desired.

Refer now to the chart and follow the details of its composition with this accompanying explanation. As a preliminary let it be mentioned that the chart will be first used for the purpose of determining the number of printing plates justified by the quantity of

printed pieces of definite size, colors, and design, ordered by a customer. It is then essential to build around these factors in such a way that their identity will be definitely retained in classifications established for the purpose of showing desired results. Column headings for the table showing quantity limits represent area classifications for electrotypes. Immediately above this heading is shown the list cost of printing plates based upon the largest area contained in the group. The maximum is used in this case as an element of safety to avoid the possibility of understating the manufacturing cost of any area in the group since a larger plate cost in relation to labor cost is reflected in fewer plates justified by a given quantity. Trade discount is taken from this list price for the obvious reason of obtaining the comparable net cost of plates with the net labor cost. For the purpose of explanation 40% is arbitrarily used. Another detail of unquestionable importance in the arrangement of this table lies in the fact that quantities determined for the number of plates shown represent absolute limits above which the next highest number of plates is justified. This result is obtained by multiplying the number of plates in the group desired with the number in the next highest group instead of squaring the original number according to the formula. From this point can begin the calculation of quantities according to number of plates and area groups selected. Remember, the cost of labor per 1,000 sheet is based upon a constant of $1. Therefore the original formula becomes as follows:

$$X^2 = \frac{Q \times 1.00}{P}$$

or: $Q = PX^2$

Substitute for (X^2) by multiplying together the progressive order of plates, denoted by (XY), for the purpose of determining quantity limits as explained above.

Then: $Q = PXY$

From this formula the values may be quickly calculated as follows:

Refer, for example, to area group (15-25) square inches for 10 plates.

List cost of 25 sq. in. plate	$2.00
Net cost—less 40% discount	$1.20

Then: Quantity equals 10 x 12 x 1.20 or, 144,000 pieces.

This process can then be repeated for every combination desired.

After this operation has been completed the next step in order is to establish the numerous variations of labor cost that affect the

quantity table which has been computed upon the constant of $1 per M sheets. As previously explained the adjustment for this variation applies in direct proportion to the quantity in the table. In other words the actual cost is to $1 as the quantity desired is to the table figure. This means that the actual cost for the variations may be used as a percentage for adjusting the actual quantity for table interpretation. As an example of the typical adjustments for ordinary printing, refer to the lower left quarter of the illustration. Here are presented bogus figures which are reasonably related and consistent enough for correct explanation. Follow, for example, the calculations required for the second group covering jobs requiring two colors. This group requires two electrotypes for each repetition of design on a sheet and therefore all adjustments must be considered in this relation. That is, if two colors require two impressions or separate passes, through a press, the relationship remains in agreement; on the other hand, if the sheet were printed in one impression on a 2-color press an adjustment of 50% would be required affecting the actual cost variation for one impression; likewise, if three impressions were necessary due to special bumping of an embossed surface, it would call for an adjustment of 150% of the actual cost variation. In a word, this adjustment brings the two elements on a corresponding basis, by the fact that the cost of one impression requiring a set of two plates will justify the purchase of fewer sets in the relation of one-half the original quantity. Then since the table is set upon a comparison of one impression to a single plate, the reason for the adjustment is obvious. The various adjustments for this factor based upon the labor cost converted to the term of a single impression is expressed by the following table:

Electros	1-*Imp.*	2-*Imps.*	3-*Imps.*	4-*Imps.*
1 Set	100%	200%		
2 Sets	50%	100%	150%	200%
3 Sets	33%	67%	100%	133%
4 Sets		50%	75%	100%
5 Sets		40%	60%	80%

Better understanding of the principle involved here will develop as the explanation of this consequence proceeds. Refer now for a case example to the Pony and Upham presses in the 2-color group and assume the following costs:

	1-*Imp.*	2-*Imps.*	3-*Imps.*	4-*Imps.*
Pony Press				
Cost per M sheets.....		$1.16	$1.04	$ .99
Upham Press				
Cost per M sheets.....	$1.81	1.46	1.34	

The costs used in this calculation should represent the total labor involved which remains constant per M sheets regardless of the number of cuts. This net labor cost is based upon 1,000 press imprints for one to four separate press passes for each sheet. The reason for the reduction in cost as the number of impressions increases, is due to a constant cost per 1,000 sheets for Inspection and Cutting which is divided by the number of impressions required for each sheet. When all of the labor costs of this special nature have been compiled into a single figure based upon 1,000 impressions according to the number of repeated passes of the same sheet, termed impressions with one exception, the standard adjustment is ready to be calculated. This exception is the result of a variation in cost of plates. In this instance the Upham press requires a curved plate which is attached to a cylinder for a 2-color operation. The cost of these plates is 50% more than the scale for flat plates and therefore fewer sets are justified than indicated by the table. The adjustment, recalled from explanation of the original equation, is in inverse proportion to the adjustment for labor variation, or the quantity after the labor adjustment. The meaning of this can be easily understood from the fact that if a 2-color job requires one flat plate at 100%, and one curved plate at 150%, then each plate constituting a set would cost 125% or 80% adjustment to the scale in inverse proportion.

The facts are now all ready for setting the standard adjustment for possible variations. Consider the figures previously mentioned in the following process for determining this adjustment:

2 Colors	1-*Imp.*	2-*Imps.*	3-*Imps.*	4-*Imps.*
Pony Press—				
Labor Cost:		$1.16	$1.04	$ .99
Relation of plate sets to impressions:		100%	150%	200%
Net adjustment:		116%	156%	198%
Upham Press—				
Labor Cost:	$1.81	$1.46	$1.34	
Relation of plate sets to impressions:	50%	100%	150%	
	(91%)	(146%)	(201%)	
Cost of Plates:	80%	80%	80%	
Net adjustment:	73%	117%	161%	

The net results can be seen to correspond with the figures shown on the chart. Let it further be added that this same procedure must be followed for any separate operation adjustment that may be necessary as illustrated by the other two classifications included with the "Regular Operation" group on the chart. The parenthetical figures, shown in the above calculation, represent the manufacturing cost relationship, the purpose of which will be fully explained in the final division of this paper under the heading, "Use of Chart."

The separate unit on the chart entitled, "To Determine Cost of Printed Stock" requires no special explanation except that it is essential to establish as few classifications as possible for quick calculation. The costs must include every item of manufacture fully covered by a reserve margin, if necessary. It is not advisable, however, to excessively burden costs that are determined by time standards which are used as a means to control costs because the chance for variation is reduced to a minimum.

Use of Chart:

In the treatment of the application of this chart to specific cases it might be necessary to repeat in principle that which has been previously explained. This will be avoided, however, if possible.

The first thing to consider is answered by the question, "What is known?" For this can be named four necessary elements as follows:

1. Kind of stock
2. Size of article and size of design
3. Design and colors for printing.
4. Quantity desired.

These are the essential facts requiring identification on the chart.

Kind of stock needs no unusual interpretation except in connection with design which may necessitate an extra impression required to bump embossed stock before the design will take ink. This is necessary usually for deep embossing or when the printed design is heavy. The cost calculation for material is possible, based on area, only after the size sheet has been determined.

Size of article and size of design are used to determine the size of printing sheet and the cost of plates respectively. The extreme dimensions of the printed design are used to obtain the area which

falls into definite classifications, heading the quantity columns on the chart. At the lower left of the chart is given maximum size sheets that can be considered for the kind of press indicated.

Design and colors for printing require most attention for the reason that upon this depends the press operations. Specifically, this factor together with kind of stock may be classified according to similar results into a cross-section presentation as follows:

Impressions: A—Indicates possibility of printing 2 colors with one impression.
B—Indicates single impression necessary for each color.
'—Indicates extra impression required for bumping.

Extra Operations: X—Indicates slipsheeting required.
Y—Indicates single sheet layout required.

	LIGHT DESIGN		*MEDIUM DESIGN*		*HEAVY DESIGN*	
	Colors Apart	*Close Register or overlap*	*Colors Apart*	*Close Register or overlap*	*Colors Apart*	*Close Register or overlap*
Plain	A—X		A—Y		A—Y	
Surface	B—X	B—X	B—X	B—X	B—Y	B—Y
Shallow Embossed	A—		A'—		A'—X	
	B—	B—	B—	B—	B'—X	B'—X
Deep Embossed	A'—		A'—		A'—X	
	B'—	B'—	B'—	B'—	B'—	B'—

Whenever specifications prohibit any ink offset on back of sheet it is necessary to slipsheet all stock except deep embossed of light design or as otherwise indicated by single sheet layout.

The symbols as shown in the table apply to each color and part of design separately and should subsequently be arranged in relation to the requirements of the completed job. For example suppose a 3-color job to be printed on plain surface had one color of reasonably solid design and the other two colors of light coverage with colors apart. According to the above form 2 colors would be run in one impression requiring slip-sheeting while the other color would require a single impression with sheet layout. By this means most ordinary job requirements may be determined.

The fourth element of quantity furnishes the basis for ascertaining the number of electro sets justified and consequently the size of sheet and cost of manufacture. Percentages in the adjustment table, "To Determine Number of Electro Sets," are to be applied directly to the quantity of the order and the result used under the proper area of design classification for reading the number of plates justified by the order.

In respect to the use of these percentages there is one very important problem to consider; this is the choice of presses, which is influenced by the lowest costs as indicated by the smallest percentages selected from the table according to any different operating combinations which will produce the same results. Before an example of this statement can be understood, it will be necessary to refer to the four rules at lower part of chart concerning the use of percentage table. Consider these rules carefully and then proceed with the following example: Assume for instance a two-color wrapper, plain surface coated stock, colors apart, one of light design and the other of medium ink coverage. This would be considered a light design on one color and a medium on the second color, when run in separate impressions. If run in one impression the same job would be considered a heavy design. The choice of operations then would be either two impressions requiring one slip-sheeting, or one impression requiring a single sheet layout. Refer now to the two-color adjustment table and consider the percentages as follows:

	Pony Press		*2-C Upham*
2—Impressions	116%	1—Impression	91%
1—Slipsheeting	33%	1—Sheet layout	60%
Total Adjustment	149%		151%

It is therefore, cheaper to run this job in two impressions on the Pony press rather than one impression on the Upham even though the adjustment for plates would be 133% for the Upham compared with 149% for the Pony. This latter comparison, however, is the true relationship of the manufacturing cost which indicates that the Upham is less. But since the cost of curved plates, as explained before, is 50% more than flat plates, the difference in labor cost is counterbalanced by this item.

In conclusion, follow closely the case example of a complete calculation in rather lengthy order with accompanying description of the working process.

Order specifications:

Stock—Coated Paper Stock (Plain surface).
Size—Wrapper 8 x 6. Printed design 7 x 5.
Design—3 colors: 2 light and apart, 1 heavy.
Quantity—200,000.

1. Determine from design and stock the printing requirements as established in cross-section form for this purpose:
   Choice: A—3 single impressions, 2 slipsheeting, 1 sheet layout.
   B—2 impressions, 1 slipsheeting, 1 sheet layout.

2. Determine from percentage adjustments the cheapest process indicated by lowest combined figure in the 3 color group:
   Pony—186% Upham—162% (Selected)
   138% Net adjustment

3. Apply percentage adjustment to quantity ordered to ascertain number of electro sets justified by chart:
   138% x 200 M equals 276 M — 12 sets of plates.
   Printed design 7 x 5 or 35 square inches (Area group 25-40).

4. Determine cost:
   Compare with maximum size printing sheet } 3 – 4 / 25 x 42
   6 x 8 equals 18 x 32 net sheet
   ½" gripper
   Printing sheet..18½ x 32
   Sheet area.....592.0 sq. ins.

Material—List price of material, assume .06 per 1000 sq. ins. Add 5% spoilage, or 105% x .06 equals .063 net cost.
Cost per M sheets—592.0 x .063 equals $37.30 per M sheets.
Number of sheets—200M divided by 12 up equals 16,667.
Therefore: 16,667 sheets @ $37.30 per M equals..... $621.68

Composition-Makeready (This job requires one makeready of 2 colors and one single color makeready).
Classification (10–14) 2 color M.R. Upham.....$26.38
1 color M.R. Upham..... 13.87 $ 40.25

Printing (Requires operations previously determined).
2 Impressions times $4.12 equals .....$ 8.24
1 Slipsheeting 3.15
1 Sheet layout 3.68
16,667 sheets times $15.07 $251.17

Inspection—Cutting—Packing (Per M Sheets).
Classification (40–80) 12 up—16,667 x $2.35.... $ 39.17

Total Manufacturing cost without printing ink		$952.27
Convert to cost per M wrappers (Divided by 200M)		4.76
Printing Ink (Assume 20% Ink Coverage) Area of wrappers 48 sq. ins. times 20% times .005		$ .05
Total manufacturing cost per M wrappers		$ 4.81

ADD SELLING EXPENSE:
Estimate Cost of Art Work and Plates

Art work (assume medium complex design)	$ 15.00
Etchings—One set of 3 plates times $6.09 each	18.27
Electros—(Refer to electro cost adjustment at upper left of chart)	
Cost of each plate—117% x $2.75 or $3.22	
Then 12 sets of 3 plates at $3.22 equals..	115.92
Estimated total cost A. W. and P.	$149.19

This concludes the subject which has been presented in such unusual detail as might cause the unpleasant feeling that this simple chart is far too complicated for practical use. It was not the purpose of this paper, however, to state generalities, to make interesting reading, but to give a complete outline of a principle that cannot be comprehended or used except after considerable experience with printing costs and even then by the usual laborious method of long calculations. There can be no doubt that after a short practice in the use of this chart any person authorized to set prices will be able to determine costs as quickly and accurately as any technical cost man with years of experience.

COSTS AND COMMERCIAL ART

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IT HAS often been thought that to control any part of an artist's activities is difficult, if not almost impossible, because of the so-called "talent temperament," but the artist—the term in this case being applied strictly to the preparation and coloring of drawings and photographs—is a skilled technician in a technical business. The commercialization of this business during the last decade has necessarily made him amenable to business practice and, generally speaking, it will be found that only in rare cases are the workers in this profession averse to aiding their employers in the estimating and controlling of the costs arising from their activities and thus contributing to their employers' welfare.

The activities of most commercial art studios can be divided as follows:—

(1) Lay Out Department.
(2) Photograph or Copying Department.
(3) Coloring Department.
(4) Finishing Department.

Departmentalizing the costs needs no explaining. Costs by departments are of use to the executive only for the purpose of comparison and then only if kept for some time. Job costs, obviously, are of much greater use and give the executive a complete breakdown of his expenditures, and guide him not only in his estimates but in the control and elimination of wastage and unnecessary charges. In job costs it is necessary to apportion to the jobs all expenses that cannot be charged directly to the jobs, such as rent, taxes, interest, etc.; in other words, the burden.

Burden will be of two kinds, that which can be directly charged to departments, such as rent, if divided according to floor space, and supervision in the department, and indirect charges or all other burden items except selling and administration.

Departmental Costs: Materials can be charged to departments by totalling monthly requisitions; labor and other outlays to departments, from a columnar payroll, cash book, and voucher register or purchase book.

Indirect Burden: The labor cost method of apportioning this has the advantage that it is simple and most equitable on the premise that the expenditures are incurred wholly in obtaining the finished product and because, in this industry, labor cost is by far the greater part of the total cost. Each department, therefore, is charged with that proportion of the indirect burden which its direct labor cost bears to the total direct labor cost, thus:

$$\frac{\text{Monthly dept. labor cost}}{\text{Total labor cost}} \times \text{Total indirect burden}$$

Since all expenses but selling and administration are now charged to departments, job costing is simplified. Assuming the order to be executed is for 5,000 11" x 14" colored enlargements

WORK ORDER NO. DATE DELIVERY DATE

CUSTOMER:

SPECIFICATION:- 5000- 14 x 20 B. & W. enlargements (face and shoulders) mount on 3/16 board, single easel, color as per sample.

	Material Req. No.	Name of Worker.	Estd. Time.	Actual Time.	Dept. Labor.	Dept. Burdn.	Total
Lay Out Dept. Retouch neg. remove face spots.		Brown, R.	2 hrs	2 hrs	3 00	4 00	7 00
Photograph Dept. Make 5000 14 x 20 from 8 x 10 neg B. & W. Submit sample.	18246	Jones, S.	140 hrs	145 hrs	217 50		
	18247	Craven, P.	140 "	135 "	168 75		
	18248	Rogers, A.	140 "	135 "	135 00	341 75	863 00
Coloring Dept. Color as per sample.		Saul, F.	250 hrs	280 hrs	700 00		
	29473	Harmon	250 "	280 "	420 00		
	29474	Paley	250 "	280 "	280 00	986 70	2386 70
Finishing Dept. Mount on 3/16 board, varnish.	31620	Dix S.	325 hrs	300 hrs	300 00		
	31621	Ryan	325 "	300 "	225 00	463 20	988 20
					Cost Labor & burden.		4244 90
					Materials		4176 20
					Plant Cost		9421 10
					S. and A.		820 00
Date Shipped:					Total Cost:		10241 10
Signed:					Estimated Cost.		9500.00

FIGURE 1

such as are used for store window display—it may be a necktie or collar advertisement— an internal order is made out with specific instructions to each department and columnized as shown in Figure 1.

As the job progresses information other than dollar cost is accumulated in each department; that it, requisition numbers and workers' names and hours, from which the job burden in each department can be computed as follows:—

$$\frac{\text{Job labor cost}}{\text{Monthly dept. labor cost}} \times \text{Monthly Dept. Burden}$$

Procedure so far has given all costs of the job other than selling and administration. If it is desired to apportion this over the total output as represented by the completed orders, for future estimating purposes, for instance, the hypothesis stated in regard to departmentalizing the indirect burden may be fairly applied to administration costs; that is, that the costs are incurred necessarily to obtain the finished product and therefore the ratio of job cost to total cost will be used. In this case burden will be included in job cost and total cost. Selling costs of course cannot be accurately related to production, but if it is desired to distribute these expenses over the total output they can be included. Thus, the job selling and administrative expenses can be obtained by the following formula:

$$\frac{\text{Job cost (excluding material cost)}}{\text{Total monthly cost (excluding material cost)}} \times \text{Monthly Selling and Administrative Expenses}$$

Wherever coloring is done by machinery or printing, or by gelatin or other process, a different problem in allocating the burden arises. Because of the investment in machinery, interest on the investment, insurance, depreciation, etc., the comparatively low wages paid the machine operators would not result in the labor cost method apportioning a fair proportion of the burden to the department making use of machinery. Without a detailed breakdown of every item one can only roughly estimate what should constitute a fair share of the general burden for the machine department. If the labor hour basis is substituted for the labor cost basis—the former method is just as simple, although wages may be lower in the machine department than in the other departments —the result will be approximately correct.

Referring to the work order as shown, if machinery is used in the coloring department an improvement in allocating the color department burden to the jobs can be obtained by substituting the productive machine hour basis for the labor cost method. This method has the advantage of equalizing the idle time and breakdowns. A job for example may be spoiled by too heavy or too light coloring but this is no reason why it should be penalized by an additional portion of the burden, as would happen if the labor hour or labor cost method is used. Furthermore, completion of the data on the internal order is simplified by this method as the counting and totalling of time cards for job order purposes is unnecessary.

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